

DECISION DOCUMENT

Blue Crab Fishery Management Plan Amendment 3 Adaptive Management



This document was developed to help the MFC track previous activity and prepare for upcoming actions for Blue Crab FMP Amendment 3 Adaptive Management.

September 2024

Background

The original [North Carolina Blue Crab Fishery Management Plan \(FMP\)](#) was adopted in December 1998, [Amendment 1](#) was adopted in December 2004, and [Amendment 2](#) was adopted in November 2013. The Amendment 2 adaptive management strategy relied on annual updates to the Traffic Light Assessment (TLA) to provide information on relative condition of the stock. Based on results of the TLA update with 2015 data, management action was required by the North Carolina Marine Fisheries Commission (MFC). To improve the condition of the blue crab stock, the MFC adopted management measures documented in the May 2016 [Revision to Amendment 2](#).

Comprehensive review of the Blue Crab FMP was originally scheduled to begin in July 2018, but at its August 2016 business meeting, the MFC voted to begin formal review immediately to assess the status of the blue crab stock and identify more comprehensive management strategies. Consequently, development of Amendment 3 began in August 2016.

Amendment 3 Background

As part of [Amendment 3 to the North Carolina Blue Crab FMP](#) a benchmark [stock assessment](#) was undertaken using data from 1995-2016. Based on assessment results, the N.C. blue crab stock was classified as overfished in 2016. The probability the stock was overfished was 98% with the average spawner abundance in 2016 estimated at 50 million crabs (below the threshold estimate of 64 million crabs). Overfishing was also occurring in 2016 with a 52% probability. The average fishing mortality in 2016 was estimated at 1.48 (above the fishing mortality threshold of 1.46).

The North Carolina Fishery Reform Act of 1997 requires the State specify a time period not to exceed two years to end overfishing and achieve a sustainable harvest within 10 years of the date of adoption of the plan. To meet the legal requirement, the division determined reductions in commercial harvest were necessary. A harvest reduction of 0.4% (in numbers of crabs) was projected to end overfishing and a harvest reduction of 2.2% was projected to achieve sustainable harvest and rebuild the blue crab spawning stock within 10 years with a 50% probability of success (Table 1).

Table 1. Catch reduction projections for varying levels of fishing mortality (F), based on 2016 data from the stock assessment, and the probability of achieving sustainable harvest within the 10-year rebuilding period defined in statute. The bolded row indicates the minimum requirement defined in statute.

F (yr-1)	Catch Reduction (%)	Probability of achieving sustainable harvest within 10 years (%)	Comments
1.48	0.0	31	2016 average F from stock assessment
1.46	0.4	45	Catch reduction to meet F threshold and end overfishing
1.40	1.7	46	Catch reduction to meet spawner abundance threshold and end overfished status
1.38	2.2	50	Catch reduction to meet minimum statutory requirement for achieving sustainable harvest
1.30	3.8	67	
1.22	5.9	90	Catch reduction to meet F target
1.10	9.3	96	
1.00	12.3	100	
0.90	15.7	100	
0.80	19.8	100	Catch reduction to meet spawner abundance target
0.70	24.3	100	

The MFC adopted Amendment 3 to the Blue Crab FMP in February 2020 to rebuild the blue crab stock. Prior to adoption, the division recommended that, at a minimum, the MFC should adopt a commercial harvest reduction of 2.2% (50% probability of success) but encouraged the MFC to consider a further reduction to at least 5.9% (90% probability of success). Further, the division encouraged the MFC to adopt a management strategy that included a prohibition on immature female hard crab harvest, a 5-inch minimum size limit for mature females, and a continuous closure period resulting in a reduction of at least 4.6% to make up the remainder of the preferred reduction. A comprehensive list of Amendment 3 sustainable harvest options can be found in [Table 4.1.12](#) and [Table 4.1.14](#) of Amendment 3.

The management strategy that the Marine Fisheries Commission ultimately adopted was estimated to result in a harvest reduction lower than the initial recommendation and provided an estimated 2.4% harvest reduction with a 50% probability of success. This reduction would be just above the statutorily required minimum (2.2%), but below the harvest reduction level needed to reduce F to the target (5.9%) and the reduction needed to increase spawner abundance to the target (19.8%). Amendment 3 management strategies have been fully in place since January 2021. Amendment 3 also maintained all measures implemented with the May 2016 Revision to the Blue Crab FMP. The management changes adopted in Amendment 3 were:

- Season closures (pot closure periods):
 - January 1-31 north of the Highway 58 bridge
 - March 1-15 south of the Highway 58 bridge
 - Possession of blue crabs is prohibited during the season closure period.
- A 5-inch minimum size limit for mature female crabs statewide.
- Remove all cull ring exempted areas.

- New crab spawning sanctuaries were established in Beaufort, Bogue, Bear, Browns, New River, Topsail, Rich, Mason, Masonboro, Carolina Beach, Cape Fear River, Shallotte, Lockwoods Folly, and Tubbs inlets with a March 1-October 31 closure.
- Crab trawls prohibited in areas where shrimp trawls were already prohibited in the Pamlico, Pungo, and Neuse rivers.
- Crab bycatch allowance in oyster dredges reduced to 10% of the total weight of the combined oyster and crab catch or 100 pounds, whichever is less.
- Criteria were approved for designating Diamondback Terrapin Management Areas where use of approved terrapin excluders will be required.
- The adaptive management framework was revised (more details about this are below).

A summary of all management measures in place through Amendment 3 can be found in the annual [FMP Update](#) or in the [Amendment 3 flyer](#).

Amendment 3 Adaptive Management

1. Update the stock assessment at least once in between full reviews of the FMP, timing at the discretion of the division
 - a. If the stock is overfished and/or overfishing is occurring or it is not projected to meet the sustainability requirements, then management measures shall be adjusted using the director's proclamation authority
 - b. If the stock is not overfished and overfishing is not occurring, then management measures may be relaxed provided it will not jeopardize the sustainability of the blue crab stock
2. Any quantifiable management measure, including those not explored in this paper, with the ability to achieve sustainable harvest (as defined in the stock assessment), either on its own or in combination, may be considered
3. Use of the director's proclamation authority for adaptive management is contingent on:
 - a. Consultation with the Northern, Southern, and Shellfish/Crustacean advisory committees
 - b. Approval by the Marine Fisheries Commission

Upon evaluation by the division, if a management measure adopted to achieve sustainable harvest (either through Amendment 3 or a subsequent Revision) is not working as intended, then it may be revisited and either: 1) revised or 2) removed and replaced as needed provided it conforms to steps 2 and 3 above.

Post Amendment 3 Stock Assessment Update

Following full implementation of Amendment 3 management measures in 2021, division monitoring programs continued to observe historically low [commercial landings](#), coupled with continued [low abundance of all blue crab life stages](#) (e.g., male and female juveniles, male and female adults, mature females). In response to stock concerns expressed by commercial crabbers and continued poor trends in abundance since adoption of Amendment 3, the division began updating the stock assessment with data through 2022, adding six years of data to the benchmark assessment. As an assessment update, there were no changes to model parameters and a peer review was not conducted, as the model configuration of the prior peer reviewed model was maintained. Results of the model update indicate the magnitude and trends for estimated recruitment, female spawner abundance, and fishing mortality were similar to the prior benchmark assessment (Figure 1), however, the Maximum Sustainable Yield (MSY)

based reference points used to determine stock status for both female spawner abundance and fishing mortality both drastically changed with the update time series (Figures 2-3). Due to the magnitude of the change in reference points, the division requested an external review of the updated stock assessment.

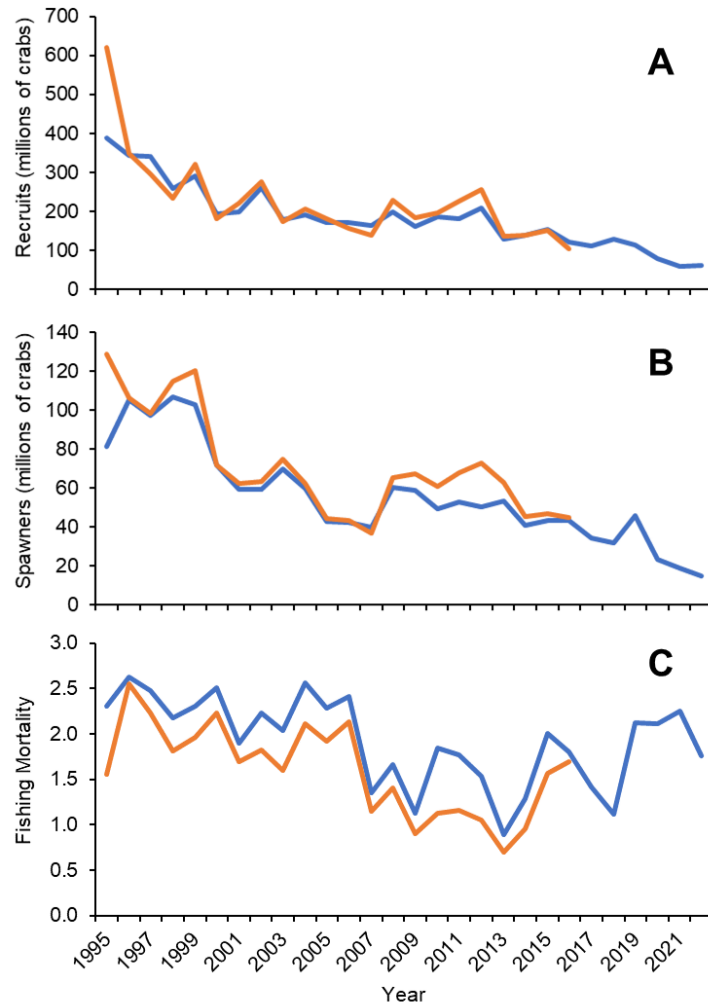


Figure 1. Comparison of estimates of (A) total recruitment, (B) female spawner abundance, and (C) fishing mortality between the 2023 stock assessment update (blue line) and the 2018 benchmark stock assessment (orange line).

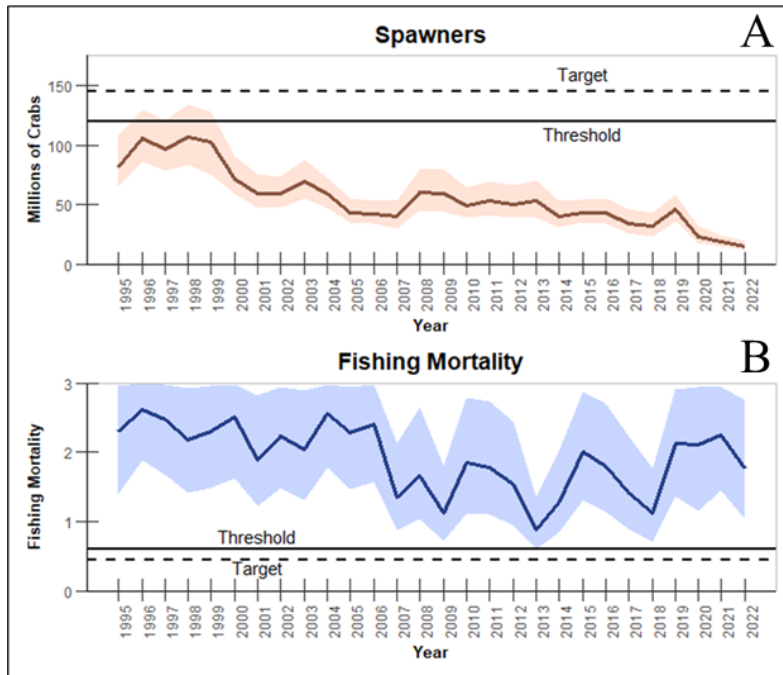


Figure 2. Annual estimates of (A) mature female spawner abundance and (B) fishing mortality relative to associated reference points for hard blue crabs in North Carolina from the 2023 stock assessment update.

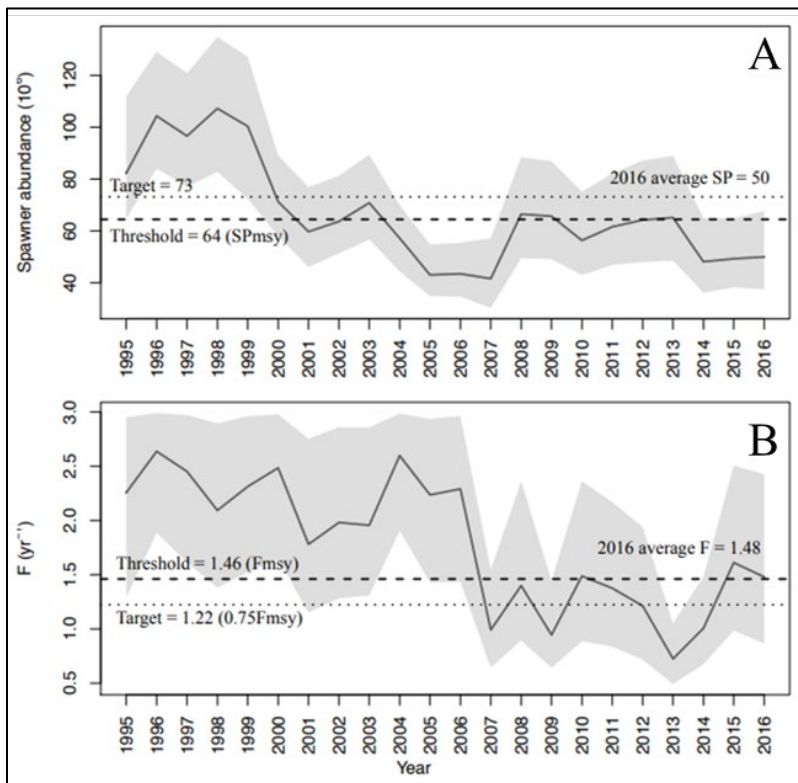


Figure 3. Annual estimates of (A) mature female spawner abundance and (B) fishing mortality relative to associated reference points for hard blue crabs in North Carolina from the 2018 benchmark stock assessment.

This external review was completed in late December 2023. The reviewers identified concerns with model specifications and results and strongly recommended resolving these issues before basing any management decisions solely on the assessment update. Suggestions provided by reviewers can only be incorporated with a new benchmark stock assessment. Given concerns with the assessment update identified by the division and external peer reviewers, **the division does not recommend using results of the 2023 stock assessment update to inform harvest reductions.**

Regardless of the availability of management advice from an updated stock assessment, stock concerns raised by commercial crabbers and trends in available data clearly show Amendment 3 management measures have not worked to reverse declining population trends as intended. Amendment 3 adopted management measures were only projected to result in a 2.4% harvest reduction with a 50% probability of achieving sustainable harvest, the minimum required by statute.

In addition, declines in the North Carolina blue crab stock are not unique, as blue crab stocks in other Atlantic coast states have shown similar declines. In January 2023 the South Carolina Department of Natural Resources released a [status report](#) for the South Carolina blue crab fishery. The report concluded the South Carolina blue crab stock has been in decline for nearly two decades and provided recommendations to prevent overharvesting, gradually reduce fishing pressure, prevent overexploitation, and strengthen enforcement capabilities. Concerns for the [Chesapeake Bay blue crab stock have also persisted](#). While the Chesapeake Bay blue crab stock is not depleted and overfishing is not occurring, juvenile abundance remains low. Precautionary management, focusing on protecting mature females and juveniles, has been recommended for the Chesapeake Bay stock and a benchmark stock assessment has been started to better understand the population.

Adaptive Management

All available information suggests the blue crab stock has continued to decline since adoption of Amendment 3 management measures in February 2020. The Amendment 3 adaptive management framework will be used to immediately address the overall declining trends in the blue crab stock. This action is appropriate given the Amendment 3 adaptive management framework states: *“upon evaluation by the division, if a management measure adopted to achieve sustainable harvest is not working as intended, then it may be revisited and either 1) revised or 2) removed and replaced as needed...”*.

Because the 2023 stock assessment update cannot be used to inform management, the division will develop recommendations based on results of the 2018 stock assessment. Using 2018 assessment results provides some guidance on appropriate management in lieu of a current stock assessment.

The Amendment 3 adaptive management framework allows any quantifiable management measure, including those not discussed in Amendment 3, with the ability to achieve sustainable harvest either on its own or in combination to be considered. The division has begun reaching out to stakeholders about fishery perceptions and management ideas and has conducted preliminary analysis of potential management measures (Table 2). Prior to implementation, the division will consult with the Northern, Southern, and Shellfish/Crustacean advisory committees and management recommendations will be brought to the MFC for approval.

Table 2. Summary of potential quantifiable management options that can be considered through Amendment 3 adaptive management including pros, cons, and anticipated level of complexity to analyze and implement.

Management Options	Pros	Cons	Complexity
Limit Crab Trawls	<ul style="list-style-type: none"> • Quantifiable • Protects females prior to spawning • Possible habitat protections • Low effort • Low market demand from fishery 	<ul style="list-style-type: none"> • Limits already small segment of fishery • Small harvest reduction 	Low
Extend existing closure period (e.g., statewide closure January 1-March 15)	<ul style="list-style-type: none"> • Quantifiable • Protect females prior to spawning • Low market demand when fishery occurs 	<ul style="list-style-type: none"> • Increased market price due to VA and MD having no harvest • Crabbers active during winter months have close relations with direct markets • Could affect “peeler crab season” • Small harvest reduction 	Moderate
Bushel/Trip Limits, sex specific or life stage specific bushel/trip limits, season specific bushel/trip limits	<ul style="list-style-type: none"> • Quantifiable • Implemented in other states • Limit harvest of vulnerable or important life stages (e.g., mature females) • Limits total harvest • Could reduce effort 	<ul style="list-style-type: none"> • Requires additional culling • Actual reductions may not be realized • Likely longer soak times of pots • Likely to affect some areas more than others 	Very High
Regional Closures	<ul style="list-style-type: none"> • Quantifiable • Current closure periods are split north and south • Accounts for region specific fishery differences 	<ul style="list-style-type: none"> • Creates inequity between regions • Possible effort shifts • Data uncertainties 	Moderate
Size limit changes/Female max size limit/Peelers min size limit	<ul style="list-style-type: none"> • Quantifiable (for max size) • Size limits currently used • Protect biologically important crabs 	<ul style="list-style-type: none"> • Requires additional culling • Loss of market value • Likely to affect some areas more than others 	High
Limit sponge crab harvest or life stage closures	<ul style="list-style-type: none"> • Quantifiable (can estimate reduction with fish house data) • Implemented in other states • Protect biologically important crabs • Some past support from public 	<ul style="list-style-type: none"> • Likely to affect some areas more than others • Unknown success of clutch once potted • Requires additional culling 	Moderate

Amendment 3 Adaptive Management Timeline (gray indicates a step is complete)

May 2024	Division presents results of stock assessment update and adaptive management plan to MFC
May 2024 – August 2024	Outreach and analysis
August 2024	Division updates the MFC on progress
September 2024	Division updates Northern, Southern, and Shellfish/Crustacean advisory committees
September 2024 – December 2024	Additional outreach and analysis. Division drafts Revision to Amendment 3
February 2025	Update MFC on draft Revision
March 2025	Public and MFC AC (Northern, Southern, Shellfish/Crustacean) review draft
May 2025	MFC approves Revision to Amendment 3

Current step →

Key Takeaways

- Amendment 3 management strategies have been fully in place since January 2021.
- The Blue Crab Stock Assessment Update was completed in 2023, but given the concerns expressed by the external peer reviewers, the Division does not recommend using the results of that update to inform harvest reductions.
- All available information suggests that the blue crab stock has continued to decline since the adoption of Amendment 3 management measures by the Commission in February 2020.
- The Amendment 3 adaptive management framework will be used to address the overall declining trends in the blue crab stock.
- The division will develop management recommendations that would have resulted in higher harvest reductions with a greater probability of achieving sustainable harvest based on 2018 assessment results and apply them to the current fishery.
- The Amendment 3 adaptive management framework allows any quantifiable management measure, including those not discussed in Amendment 3, that has the ability to achieve sustainable harvest either on its own, or in combination, to be considered.
- Prior to the implementation of any management, management recommendations will be brought to the MFC for approval.